

Development of methods to optimize gold recovery and minimize waste and environmental hazards. Case study of Rwanda and Nigeria.

MUNGANYINKA Jeanne Pauline

RSIF-PASET Scholar, Materials Science and Engineering Department, Mining and Mineral Processing Program.

Pan African Material Institute (PAMI)/African Center of Excellence (ACE)/African University of Science and Technology, Abuja, Nigeria.

About the Center and University

The African University of Science and Technology (AUST), Abuja is a pan-African research university of sub-Saharan Africa (SSA)

The university offers MSc and PhD programs and hosts the Pan African Materials Institute (PAMI), and Africa Center of Excellence (ACE) with a focus on Materials Science and Engineering.

- **Vision:** To prepare students to become very high level professionals who can play a transformational role in African industry and academia.
- **Mission:** To bring the highest level of technical education and research to Africa.



Some of the innovation for AUST include: Bamboo bicycle, nonmaterial for cancer disease diagnosis and treatment, water filters, energy storage devices, sustainable building materials and technology incubation duties.



Mineral wealth of Africa (Rwanda and Nigeria)

- African continent that is rich with mineral/material deposits including gold, uranium, chromium, platinum and copper.
- Gold in Nigeria is found in alluvial and eluvial placers abundance in the northwest and southwest of Nigeria.



- Rwanda, in addition to the 3T (Tin, Tantalum, and Tungsten) as the dominant mineral deposits, is also blessed with gold deposits, but almost all these mineral endowments are exported without value addition.

Current methods used in the processing of gold include the use of harmful materials such as cyanide and mercury, which are highly toxic to people – including mine workers- and are a great risk to the environment including groundwater.



Location of different minerals in Rwanda.

OBJECTIVE OF THE RESEARCH

The aim of the research is to develop an environmentally safe and economic method for gold recovery.

Specific objectives:

- Characterize gold ores from different locations in Rwanda and Nigeria.
- Review and assess the different factors affecting gold recovery using different methods.
- Develop an environmentally-friendly and economic method for gold recovery.

Potential Impact:

Artisanal mining to Healthy and wealthy

- Improve productivity and safety of artisanal mining.
- Environmentally-friendly method for gold recovery.
- Reduction mining waste.
- Increase contribution of mineral sector to GDP.

Difficult condition insufficient profit



Safe method to better income



WHY THIS WORK IS IMPORTANT???



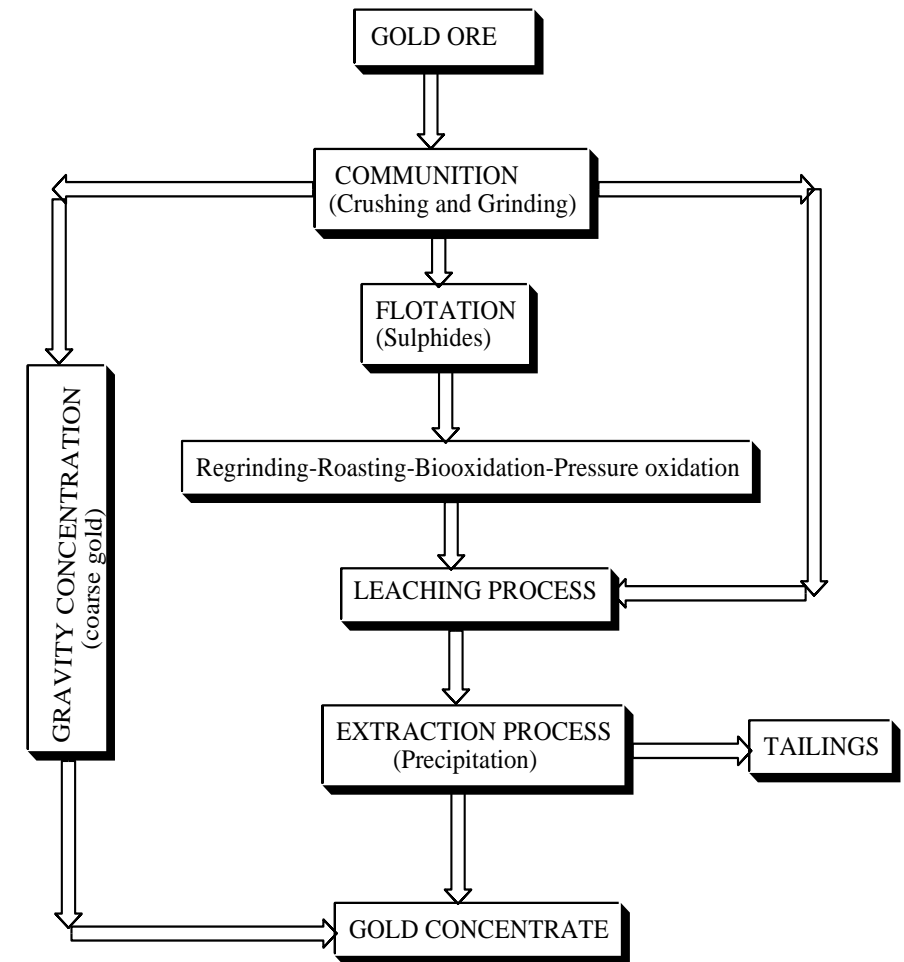
Methods

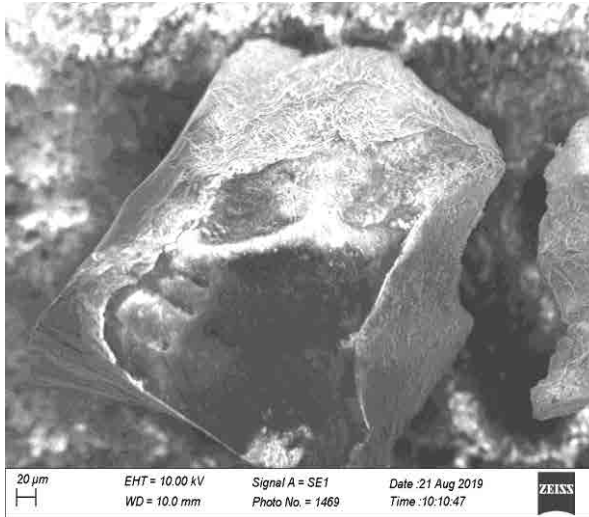
- Gold ore characterization using (XRD), (SEM), (EPMA); (XRF) and (AAS).
- Biological method: using bacteria that are able to oxidize sulphide mineral to release gold particles.
- Thiosulphate leaching method will be applied to determine which is more effective for a particular ore type.
- Factors affecting gold recovery shall be studied.
- Environmentally-friendly method of gold recovery shall be developed.

Expected results

- The use of advanced biological methods leaching process targeting over 93% pure gold recovery.
- A new efficient and environmentally friendly method for gold ore beneficiation

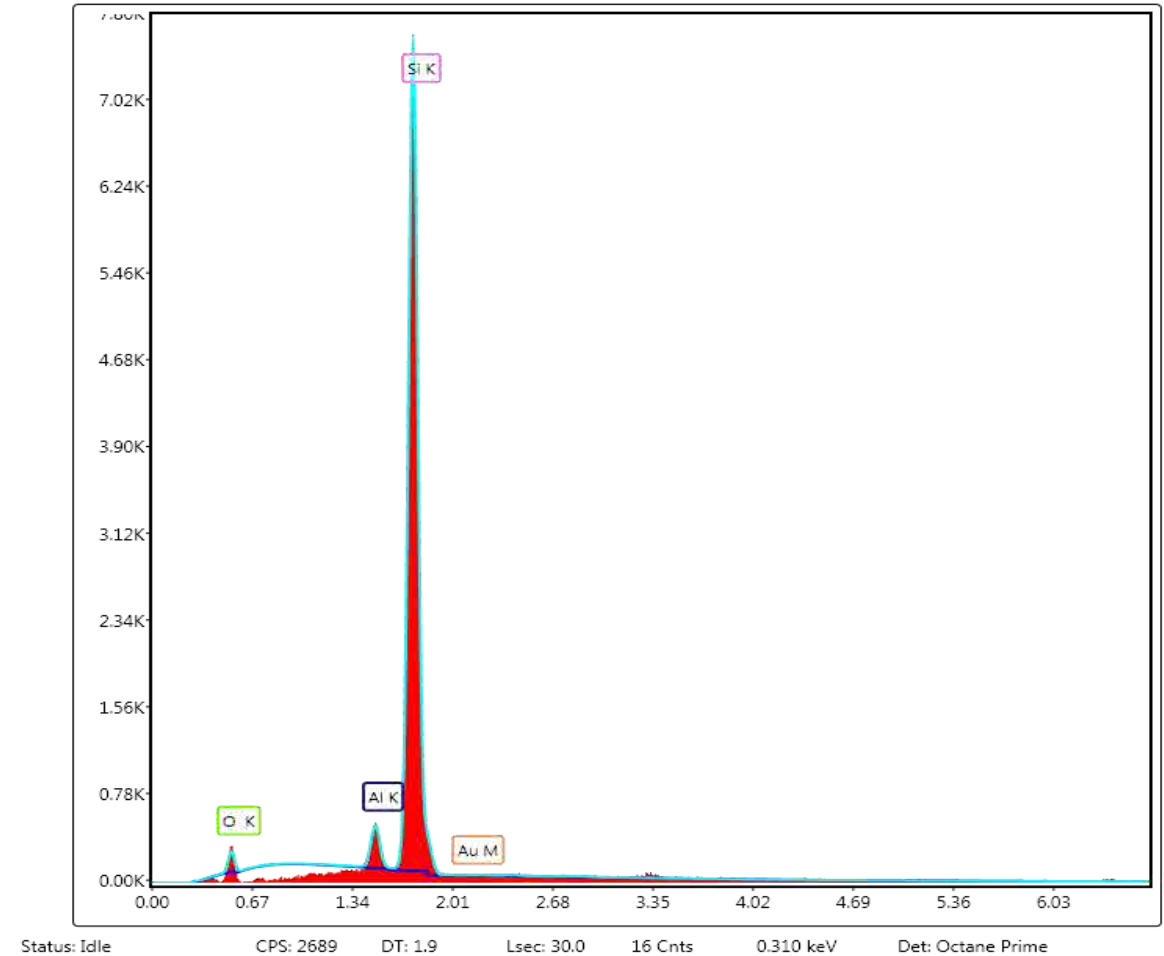
Flow diagram





Gold ore Image generated by SEM

STATUS: Literature review completed, Samples collected, currently characterizing sample. Subsequent to study recovery method and developing new method.



View of Gold ore associated with O K Al K Si K Au M after characterization by EDS.

SANDWICH PROGRAM BENEFIT

FOR SCHOLAR

At WORCESTER POLYTECHNIC INSTITUTE(WPI)

- Access to advanced analytical and laboratory facilities.
- Working with experienced scientists in the field will lead to excellent publications in high impact journals.
- Networking with well renowned scientists that can facilitate future placements in career development.
- The active and motivating environment will help me to develop transferable skills for a successful career.
- Socio-cultural exchange.
- Focus on my PhD thesis to be completed on time.

FOR RSIF-PASET

- Achievement of RSIF-PASET objectives by generating the competitive researchers in sub-Saharan Africa.
- As Ambassadors of the program, RSIF-PASET will be well known globally. Who can accelerate sub-Saharan Africa's socio-economic transformation.

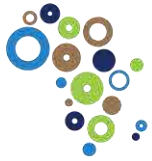
Scholar: **Munganyinka Jeanne Pauline**

Supervisors: Adelana Adetunji, and Abdulganiyu Alabi

Materials Science and Engineering Department, African University of Science and Technology, Abuja, Nigeria.

jmunganyinka@aust.edu.ng/mungapauline54@gmail.com

+2347013998093



PASET

Partnership for Skills
in Applied Sciences,
Engineering & Technology



World Bank Group

ACE Africa Centers of Excellence

THANK YOU!!!